

THE MANAGEMENT IMPLICATIONS OF NEW INFORMATION TECHNOLOGY

**EDITED BY
NIGEL PIERCY**



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PREFACE

There is clearly wide recognition in the academic and popular literature that recent years have displayed all the signs of what may, without exaggeration, be regarded as a revolution in the general capacity to process information. Transformations in the ability to capture data, to manipulate and store them, and to disseminate and communicate information, and to apply these abilities in quite novel areas, have been radical and have occurred with escalating rapidity, frequency, and discontinuity.

While the widespread use of mainframe computers is a well-known and established fact of working life, it is the advent of newer technologies, and particularly microelectronics, which have raised the most fundamental and intractable issues. Indeed, it should be borne in mind that we continue to experience rapid, accelerating technological change, and it has been suggested, for example, that at the time of writing the microelectronics revolution is itself in danger of being overtaken by optics technology and other developments.

Indeed, it is the very pervasiveness and cheapness of new information technology, which generates a wide range of fundamental questions and increases the urgency of providing answers. The areas influenced by these issues in society at large are wideranging, but the particular focus in this book is the impact of new information technology on working life, and specifically its impact on business organisations and the managers and other employees within them.

It is clear that a great deal of attention has been devoted to the overt and observable impact of new information technology on business, in replacing earlier technologies. Most obvious, perhaps, are such examples as the micro or mini computer replacing the clerical handling of paperwork (or replacing the mainframe computer terminal) and the word processor replacing the typewriter in the office, or the automation of production processes through the use of computer controlled machines and robots. Even on this level, there have been some signs that such transitions have been far from straight-

forward, and change has been accompanied by unanticipated and often dysfunctional side-effects. For example, in upgrading management information systems through new technology, it has quickly become apparent that our understanding of how managers use information to make decisions is somewhat limited, and our ability to anticipate and cope with the organisational aspects of information systems change is even more constrained.

However, what is even more disturbing is that with continued innovation in information technology there are accompanying changes in organisational functioning and management processes, which are furthered by, as well as being implemented by, new technology. Our understanding, for instance, of the impact of new technology on management control to date may be considered as yet rudimentary, and yet of fundamental significance to organisational participants.

The suggestion, therefore, is that attention should be focussed, with some urgency, not simply on the problems of implementing new technology, but on the issues involved in adapting organisations and management to cope with a very different working situation. It is to this somewhat ambitious endeavour that this present volume is dedicated.

Perhaps the central point of the ideas and issues expounded here is that the technology exists and is largely in-place, with effects which have yet to be fully analysed. The implication is that the response required from management should be strategic and proactive and not merely an ad hoc reaction to implementation problems.

While the contributions put forward in this book are relatively wide-ranging, reflecting considerable variation in the background expertise and areas of specialisation of the authors, their common thread is the analysis of the importance of new information technology for management.

This first volume in the new UWIST/Croom Helm Series: Management and New Information Technology, aims to take a fairly general overview of the field, but it is to be followed by more specialised volumes on particular topics such as industrial relations, management control and organisational structure, and management information systems, among others.

The target readership for this current volume falls into two main areas: firstly, the business school, where management teachers, researchers and business students are faced with the problems of analysing, and preparing for work in the new technology environment; and secondly, the business manager, who is already unavoidably immersed in that environment. It is intended that the papers included here will be of interest and value to both groups, and to those with general and functional management responsibilities, in a wide range of industries.

The majority of the chapters in this book started life as papers presented at a symposium run by the Department of Business Administration and Accountancy at UWIST, in September 1983,

and therefore thanks are owed to all those who played a role in organising and participating in the symposium, as well as especially to the authors of the work presented in this book. In particular, Professor Roger Mansfield is at least as responsible for the symposium taking place and this volume being produced, as is the editor. Additionally, Dr. Catherine Bailey undertook the proof-reading task, for which gratitude should be expressed, as also to Miss Kath Hollister for invaluable help in the final preparation of the manuscript.

Lastly, very special mention should be made and thanks extended to Miss Stevie Burges at UWIST, for her efforts in handling the administrative burdens of the symposium, for producing the copy of all the papers produced in this book, under the usual unfair pressures, and for assisting in indexing the book.

This said, the residual shortcomings in this volume remain inevitably the responsibility of the editor.

Nigel Piercy
UWIST, January 1984

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Chapter 1

MANAGEMENT AND NEW INFORMATION TECHNOLOGY

Nigel Piercy

INTRODUCTION

A fitting starting point in an exercise of the type represented by this volume would seem to be to attempt at least a working definition of 'new information technology', even though others later in the book note the ambiguity and lack of precision in the term. One such attempt is provided in the statement:

'Information Technology (IT) is the coming together of the existing computing, communication and control engineering technologies. It affects the way we live, work and enjoy ourselves and our future ability to compete in the "information society".' (Department of Industry, 1982)

While such a definition may be considered, in technical terms, ingenuous to the point of being simplistic, it is none the less suggestive of two factors of central importance: the convergence of previously separate technologies, and a broad and pervasive impact on society.

The 'new' in this present context of new information technology arises from a third, similarly fundamental, characteristic: simply the rapidity of shared technological change, as illustrated recently by Pelton (1981). Pelton notes of the convergence of the telecommunications, information processing and energy sectors that:

'These industries will be increasingly using common technology, derivative of today's silicon chip microprocessors, photovoltaic cells, robotic devices and space electronics.' (Pelton, 1981)

Pelton is led to the term 'telecomputerenergetics' as a way of describing such technological convergence, based on the disappearance of boundaries between telecommunications, information processing and energy, and their overlapping or common reliance on the same technological base. His concept is of a

worldwide information network, allowing for 'global talk' between communities of different kinds (Pelton, 1981).

This said, the present discussion is concerned not with the technology itself - in its accelerating rate of change or the convergence of its components - nor even directly with its broad impact on society at large. Rather the interest here is with the implications of new information technology for one major sector of society - those managing at various levels in both commercial and public organisations. Clearly, such organisations are dependent on their various environments - for resources, markets, social legitimacy, and so on - so the implications of new information technology for management are to some extent inseparable from the broader effects on society.

In this sense, the first goal pursued by this present work is to facilitate the analysis and understanding of the new environment for management - both within and outwith the organisation itself.

Over and above the analysis of the impact of environmental change, however, a second goal is to examine the more active managerial choices faced and the types of responses implied. The availability of the concrete output of the microelectronic technological revolution is indisputably with us, together with the related and increasingly sophisticated software.

This suggests firstly that attention be devoted to the process of technological innovation in organisations. In this context, one researcher has noted of his work that:

'The research shows that popular predictions about the radical and automatic advantages of new technologies are exaggerated... management has a choice of means and ends in the use of new technology; these choices can and should be identified and evaluated in advance of change.'
(Buchanan, 1982)

While this provides what is perhaps the central focus for this book - choice and managerial discretion in the management of the new technology - even then, only a start has been made in making explicit those managerial choices faced, in the sense that while operational implementation is of vital interest, the technology impact is potentially far greater than simply adding peripherals like word processors and leaving it at that. The new information technology potentially impacts on such diverse and fundamental issues as: the degree and type of control exercised by management in organisations, and hence through management style on organisational climate; the structure of organisations - since structure may be represented as information flow - and thus on the relationships and the roles played within the structure; the pattern of jobs - and thereby at the individual level on motivation, satisfaction, performance, and at the macrolevel on employment and educational requirements; the relationships between organisations, and on the tendency